Air gap membrane distillation: its recent potential in desalination processes

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membrane distillation (MD) is a thermally driven membrane separation process, in which only vapor molecules are transported through hydrophobic membranes. MD process has many advantages, namely, low operating temperature and hydraulic pressure, high rejection of solutes, performance independent of high osmotic pressure, less-sensitive to feed concentration for seawater desalination, less requirements on membrane mechanical properties and potentially good permeate flux. Air gap membrane distillation (AGMD) is one of the MD configurations. This configuration contains a stagnant air gap between the membrane and a condensation surface where the evaporated volatile molecules cross both the membrane pores and the air gap to condense over a cold surface in the membrane module. an AGMD process provides the freedom of using any coolant as the coolant does not mix with the condensate as for the case in the other configurations. Moreover, AGMD can deal easily with membrane leakage and in case of membrane damage, in which the MD process can be stopped for a while and the distillate does not have the chance to get contaminated like that in other configurations. AGMD has been investigated as a single or integrated with other process in desalination of seawater. This work will show the updated applications of AGMD in desalination processes using assorted designs and modified configurations to increase the permeate flux and AGMD performance.

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